

PTO 1390 Page 1 of 1

US Dept. of Commerce Pat. & Trademark Office

Attorney's Docket No.

22064

TRANSMITTAL LETTER TO THE UNITED STATES
DESIGNATED/ELECTED OFFICE (DO/EO/US)
CONCERNING A FILING UNDER 35 USC 371

US. Application No. (if known)

10/018456

INTERNATIONAL APP. NO.
PCT/EP00/05840

INTERNATIONAL FILING DATE
24 June 2000

PRIORITY DATE CLAIMED
30 July 1999

TITLE OF INVENTION

SELF-SEALING COMPACT SPINNERET FOR A MELT SPINNING PROCESS

APPLICANT(S) FOR DO/EO/US

Heinz-Dieter BEECK et al

Applicant herewith submits to the United States Designated/Elected Office (DO/EU/US) the following .

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 USC 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.
3. ☐ This is an express request to begin national examination procedures (35 USC 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 USC 317(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 USC 371(c)(2)).
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau.
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Patent Office.
6. ☒ A translation of the International application into English.
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 USC 371(c)(3)).
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau.
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 USC 371(c)(3).
9. ☒ An oath or declaration of the inventor(s) (35 USC 371(c)(4).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 USC 371(c)(5)).

Items 11. to 16. below concern documents or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☒ An Assignment for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.
 ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items of information.

Drawing (1 sheets)

US Application no. (if known)

10/018456

International Application no.

PCT/EP00/05840

531 Rec'd PCT

Attorney's Docket No. 22064

12 DEC 2001

17. The following fees are submitted:

Basic National Fee (37 CFR 1.492(a)(1)-(5):

Search report has been prepared by the EPO or JP \$890.00

Int'l prel. exam. fee paid to USPTO (37 CFR 1.482) \$710.00

No int'l prel. exam. fee paid to USPTO (37 CFR 1.482)

but int'l search fee paid to USPTO (37 CFR 1.445(a)(2)) \$740.00

Neither int'l prel. exam fee (37 CFR 1.482) nor

int'l search fee (37 CFR 1.455(a)(2)) paid to USPTO \$1040.00

Intl. prel. exam. fee paid to USPTO (37 CFR 1.482)

and all claims satisfied provisions of PCT Art. 33(2-4) \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT

CALCULATIONS PTO USE ONLY

\$1,040

Surcharge of \$130.00 for furnishing oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).

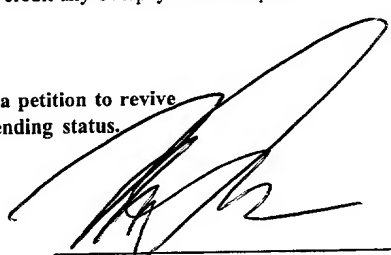
CLAIMS	NO. FILED	NO. EXTRA	RATE		
Total claims	7	0	\$18	\$0	
Ind. claims	0	0	\$84	\$0	
MULTIPLE DEP. CLAIM(S) (if applicable) (see prel. amt.)			280		
TOTAL OF ABOVE CALCULATIONS				\$1,040	
Reduction of ½ for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (37 CFR 1.2, 1.27, 1.28)				\$0	
SUBTOTAL				\$1,040	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).					
TOTAL NATIONAL FEE				\$1,040	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The Assignment may be accompanied by an appropriate PTO-1595 cover sheet (37 CFR 3.28, 3.39)				\$40	
TOTAL FEES ENCLOSED				\$1,080	
				Amt to be refunded	
				Amt to be charged	

- a. ☐ A check in the amount of \$1040 to cover the above fees is enclosed
- b. ☐ Please charge my deposit account 18-2025 \$00.00 to cover the above fees. A copy of this sheet is enclosed.
- c. ☒ Please charge the amount due to the credit card identified in the attached PTO-2038.
- d. ☒ The commissioner is authorized to charge any additional fees which may be required or credit any overpayment to deposit account 18-2025. A copy of this sheet is enclosed
- e. ☒ A PTO-2038 in the amount of \$40 to cover recordal of the Assignment is enclosed

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

Send all correspondence to:

The Firm of Karl F. Ross P.C.
5676 Riverdale Ave. Box 900
Riverdale (Bronx), NY 10471


Herbert Dubno, Reg. No. 19,752

22064

10/018456
531 Rec'd PCT 12 DEC 2001

IN THE U.S. PATENT AND TRADEMARK OFFICE

Inventor Heinz-Dieter BEECK et al
Patent App. Not known (US Nat'l phase of PCT/EP00/05840)
Filed Concurrently herewith
For SELF-SEALING COMPACT SPINNERET FOR A MELT
SPINNING PROCESS
Art Unit Not known
Hon. Commissioner of Patents
Washington, DC 20231

PRELIMINARY AMENDMENT

Prior to examination of the above-identified application,
please amend as follows:

In the Claims:

Claim 4, line 1, delete "one of claims 1 to 3", insert
instead -- claim 1 --,

Claim 5, line 1, delete "one of claims 1 to 4", insert
instead -- claim 1 --,

Claim 6, line 1, delete "one of claims 2 to 5", insert
instead -- claim 2 --,

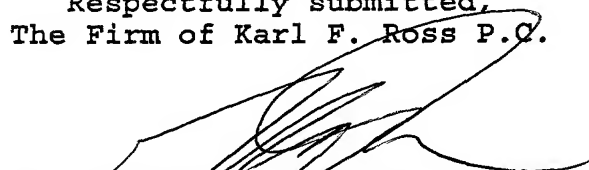
Claim 7, line 1, delete "one of claims 1 to 6", insert
instead -- claim 1 --.

Atty's 22064

Pat. App. Not known - US phase of PCT/EP00/05840

This preliminary amendment is submitted just to reduce
claim charges.

Respectfully submitted,
The Firm of Karl F. Ross P.C.


By: Herbert Dubno, Reg. No. 19,752
Attorney for Applicant

12 December 2001
5676 Riverdale Avenue Box 900
Bronx, NY 10471-0900
Cust. No.: 535
Tel: (718) 884-6600
Fax: (718) 601-1099

rg

1/PRTS

10/013456
531 Rec'd PCT

12 DEC 2001

Transl. of PCT/EP00/05840

[T R A N S L A T I O N]

SELF-SEALING COMPACT SPINNERET FOR THE MELT SPINNING PROCESS

DESCRIPTION:

The invention relates to a spinneret for the spinning of thermoplastics having a central polymer melt inlet passage, a filter arrangement comprised of one or more filter disks of different filter finenesses [filter grades], a spinneret plate and a housing close-fitting around and receiving the filter arrangement and the spinneret plate.

Pressure build-up, shear and filtering of the polymer to be spun in a spinneret are usually accomplished by means of a sand filling as is described for example in U.S. Patent 5,304,052 or U.S. Patent 5,795,595. These sand fillings, whether of steel grit or pure quartz sand, are however associated with various drawbacks:

15 for one, the sand fillings themselves are not identical from spinneret to spinneret even when prepared with the greatest of care and for another there are handling difficulties with respect to filling with sand and the transport of the filled spinnerets.

20 Apart from this, discrete sand grains can render the internal seals of the spinnerets ineffective. These seals formed during the incorporation of the sieve filter, form first of all overflows

because of their U shape and also small dead zones, i.e. in the U shaped configurations, exchange is rendered difficult and can result in a decomposition of the polymer. There is also a cost factor. Each component contributes to cost and seals are the origin of ongoing operating costs since they can be used only once and with each nozzle replacement must be renewed. In addition they can provide no absolutely reliable seal as is known in practice since fabrication and mounting defects invariably increase with increasing numbers of the individual parts.

To alleviate some of the drawbacks associated with sand fillings it has been proposed to provide a filter construction as is known for example from DE 29 26 533 C2. Thus a method has been provided in which the individual filter disks are cold-pressed together so that a substantially better filter effect is produced than is the case with an identical arrangement with loose filter disks. Such cold-sintered filters are provided with a sealing enclosure and are supplied by various suppliers under commercial names like "Porostar" or Multipor". The sealing enclosure can suppress the aforementioned drawbacks.

The object of the present invention is to provide a spinneret for the spinning of thermoplastics which avoids the aforementioned drawbacks both from the point of view of sand fillings as well as the sealing enclosures. As a result the spinneret should have a configuration that is as compact as possible. The solution to these objects is achieved according to

the invention with a spinneret according to the features of the patent claims.

According to the invention, filter structures of filter disks cold-pressed against one another are used but without the conventional sealing housing by providing them in a housing bore which matches them as precisely as is possible [press fit] whereby the material of the filters should have a substantially higher coefficient of thermal expansion than the material of the housing. The sealing of the filter structure is effected at the operating temperature by thermal expansion and with the spinneret plate in an optional manner.

Further it is proposed to fabricate the spinneret plate out of a material with a high coefficient of thermal expansion and to insert it into a bore in the housing which receives it in as close to a matching fit [press fit] as is possible. In this case the sealing of the spinneret plate is effected at the operating temperature by thermal expansion. The filter arrangement can be constructed in an optional manner and can be fabricated from a material with an optional coefficient of thermal expansion.

Preferably the filters of the filter disks cold-pressed together as well as the spinneret plates are composed of materials of high coefficients of thermal expansion and both parts are inserted in bores with press fits in a housing fabricated from a material with a lesser coefficient of thermal expansion.

Preferably the spinneret plate is additionally provided with a thread in its lower half and directly screwed into the

housing so as to obtain the tight fit sealing seat described previously, the thread and the abutment of the spinneret in the housing being so formed that the spinning hole pattern is always in the spinning hole pattern is always in the same orientation. This ensures that by screwing it in to its abutment [or stop], the correct blowing onto the filaments as they are spun out is effected.

Preferably the housing at its lower end is provided with a projecting collar which has at least three grooves for receiving a tool for screwing the spinning system in or out and which protects the spinneret against detrimental contact during the handling.

The filter unit according to the invention avoids the drawbacks of classical sand filtration. The elimination of the conventional sealing results in a significant cost saving and enhanced sealing reliability. By the suitable choice of materials and tolerance of fit of the individual parts of the spinneret according to the invention, the sealing effect is brought about at the operating temperature by the increased expansion of the inner components, namely the filter and/or the spinneret plate, with respect to the outer lying housing, without the requirement for additional elements. Further the short and compact construction is advantageous: cost effective fabrication and easier handling with more uniform and identical filtration from nozzle to nozzle.

The detailed description of a preferred embodiment of the invention follows in connection with FIG. 1 which shows an

illustration of a spinneret arrangement according to the invention by way of example: In a housing 1, a cold-sintered filter 2 is disposed, whose construction comprises individual layers of filter disks of different filter fineness, specifically selected for the particular spinning process, on a spinneret plate 3. In this exemplary spinneret arrangement, the spinneret plate 3 is fastened by means of a thread in the housing 1. This thread in the housing 1 and on the spinneret plate 3, are thus so configured that upon screwing of the plate in until it reaches an abutment [stop] the spinning orifice pattern is always located at the same place so that the correct blowing onto the filaments as they are spun out of the orifices can be assured. The connection of the polymer melt supply is effected via the connecting seal 4 and adapter (not here further shown) to the heating vessel (also called the spinning beam). The embodiment can be matched completely to the requirements of the user and the equipment available to him.

The housing 1 is comprised of material No. 1.4057 (according to German Industrial Standard - Steel Key), a material with a relatively low thermal expansion coefficient. The spinneret plate 3 can be composed of material No. 1.4580 and the filter structure 2 of material No. 1.4301 or 1.4541, all materials with a relatively high coefficient of thermal expansion. The fits are so selected with respect to the dimensions and materials that the individual parts, in a cold state can easily be fitted together and disassembled from one another and that the sealing effect on the one hand will result at the latest shortly before the specific

spinning temperature is reached and on the other hand the parts at elevated cleaning temperature (about 450 - 540°C) will not be damaged by overexpansion.

5 The desired self-sealing function in the operating state is achieved without conventional seals by the targeted pairing of materials and selection of the fits: the four parts, housing 1, filter 2, spinneret plate 3 and connection seal 4 are mounted together in the cold state and thereafter heated as is customary. Because of the different thermal expansions, the sealing effect arises and the spinneret can spin the filaments at optional pressure. The outer housing 1 is thus comprised of material of a relatively low coefficient of thermal expansion and the inner parts, filter 2 and/or spinneret plate 3 can be fabricated by contrast of a material with a higher thermal expansion coefficient. 10 The dimensions are so selected that the parts can easily be mounted in the cold state (room temperature) but at the operating temperature for spinning (about 300°C) because of the differential expansion can yield a self-sealing press fit between the parts. Upon termination of spinning, the complete spinneret is subjected 15 to a cleaning and first after cooling is disassembled. Thereafter, the spinneret plate 3 and the filter element 2 which can thus be used primarily like a filter candle, can be further cleaned and scraped or subjected to ultrasound.

20 The sealing principle here expounded upon using differential thermal expansion is not limited to the described spinnerets and filter uses but can be used universally wherever

filtering, shearing or spinning is desired whether for microfibers, textile filaments, high strength tire cords or other applications. It remains for the product or applications expert to select the configuration by the choice of the cold-sintered filter, the materials and the fits for their special cases either by analysis or empirically.

Reference character list:

1. Housing
2. Filter structure, filter
3. Spinneret plate, nozzle plate
4. Connection seal

Patent Claims:

1 1. A spinneret for spinning thermoplastics with a
2 central polymer melt inlet passage, a filter arrangement (2)
3 comprised of a plurality of filter disks of different filter
4 fineness which are fixedly bonded together by cold pressing, a
5 spinneret plate (3) and a housing (1), which closely surrounds and
6 receives the filter arrangement (2) and the spinneret plate (3)
7 characterized in that said filter arrangement (2) has no sealing
8 enclosure and is comprised of a material with a higher thermal
9 expansion coefficient than that of the material from which the
10 housing (1) surrounding it is fabricated.

1 2. A spinneret for spinning of thermoplastics having a
2 central polymer melt inlet passage, a filter arrangement (2)
3 comprised of one or more filter disks of different filter fineness
4 and optional type, a spinneret plate (3) and a housing (1)
5 surrounding and receiving the filter arrangement (2) and the
6 spinneret plate (3) characterized in that the spinneret plate (3)
7 is comprised of a material with a higher thermal expansion
8 coefficient than that of the material from which the housing (1)
9 surrounding it is fabricated.

1 3. A spinneret for spinning of thermoplastics having a
2 central polymer inlet passage, a filter arrangement (2) comprised of

3 a plurality of filter disks of different filter fineness which are
4 fixedly bonded together by cold pressing with one another, and a
5 spinneret plate (3) and a housing (1) closely surrounding and
6 receiving the filter arrangement (2) and the spinneret plate,
7 characterized in that the said filter arrangement (2) has no
8 sealing enclosure and the filter arrangement (2) and the spinneret
9 plate (3) are comprised of materials with a higher thermal
10 expansion coefficient than the material from which the housing (1)
11 surrounding them is fabricated.

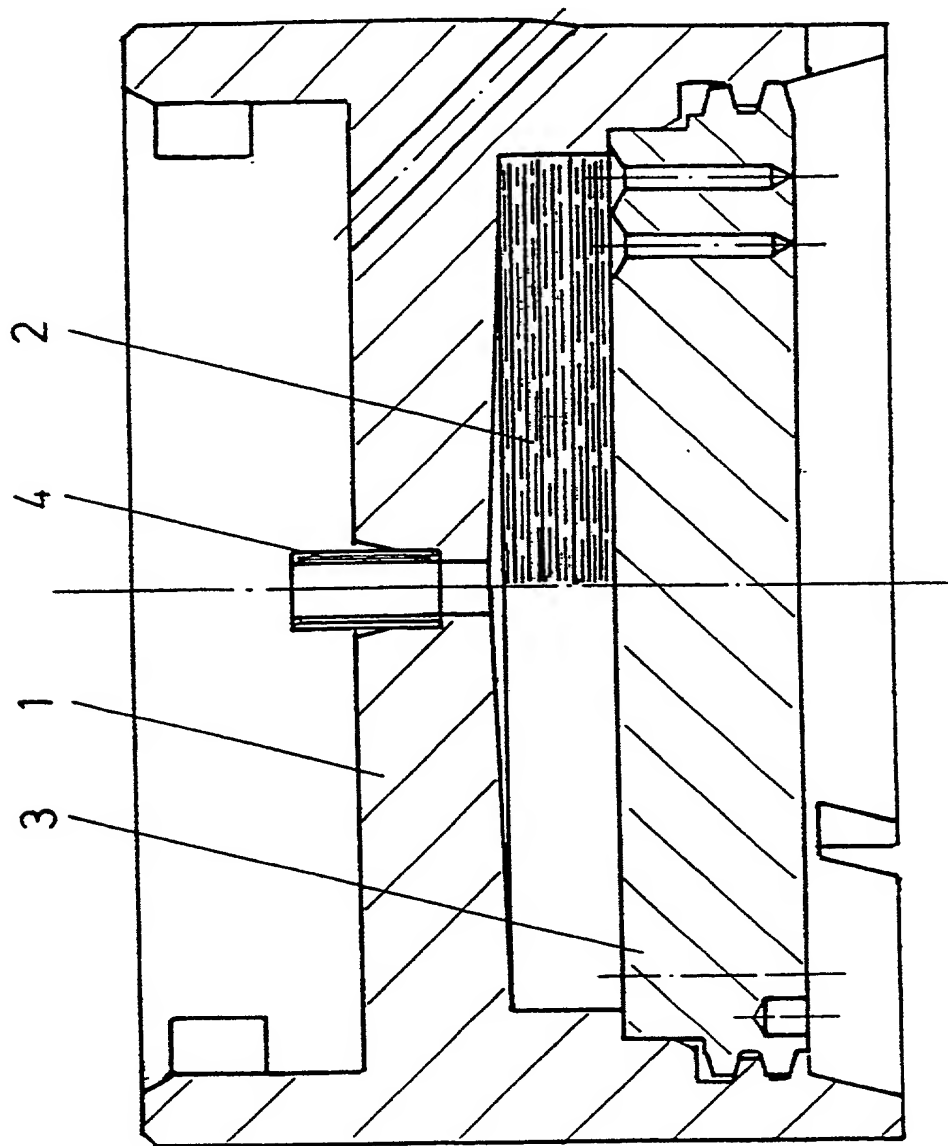
4. The spinneret according to one of claims 1 to 3
characterized in that the spinneret plate (3) and/or the filter
arrangement (2) are composed of austenitic steel like for example
Nos. 1.4301, 1.4541, 1.4580 or a material with a similarly high
thermal expansion coefficient and that the housing (1) surrounding
them is fabricated from a material with a lower coefficient of
thermal expansion like, for example No. 1.4057 or a similar
chromium steel or refractory material.

5. The spinneret according to one of claims 1 to 4
characterized in that the dimensioning is so selected that the fit
between the outer diameter of the spinneret plate (3) and/or the
filter arrangement (2) on the one hand and the bore receiving it in
the surrounding housing (1) on the other hand provides a slight
play fit at room temperature which is transformed at operating

7 temperatures based upon the different expansions of the parts, into
8 a self-sealing radial press fit.

1 6. The spinneret according to one of claims 2 to 5
2 characterized in that the spinneret plate (3) is comprised of a
3 material with a higher thermal expansion coefficient than the
4 material of the housing (1) surrounding it and that the spinneret
5 plate (3) has in its lower half additionally a thread provided
6 which is directly screwed into the housing (1) whereby the thread
7 and the stop of the spinneret plate (3) in the housing (1) are so
8 formed that the spinning orifice pattern always has the same
9 orientation so that the correct blast on the filaments as they are
10 spun is ensured by the screwing of the spinneret plate (3) to its
11 stop.

1 7. The spinneret according to one of claims 1 to 6
2 characterized in that the housing (1) has at its lower end a
3 projecting collar which has at least three grooves for receiving a
4 tool for screwing the spinning system in and out and in that the
5 spinneret plate (3) is thereby protected against detrimental
6 contact during handling.

Fig.1

22064

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that: My residence, post-office address, and citizenship are as stated below next to my name,
I believe that I am an original joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled

SELF-SEALING COMPACT SPINNERET FOR A MELT SPINNING PROCESS

the specification of which was filed on **24 June 2000** as PCT application **PCT/EP00/05840**.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 USC 119 of any foreign applications for patent or inventor's certificate listed below and have also identified below any foreign applications for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Applications

Country	Number	Filing Date	Priority claimed
DE	19935982.2	30 July 1999	Yes

I hereby claim the benefit under 35 USC 120 of the United States Application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States Application(s) in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose material information as defined in 37 CFR 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Serial Number	Filing Date	Status
PCT/EP00/05840	24 June 2000	Pending

I hereby appoint as attorneys to prosecute this application and to transact all business connected therewith: **Herbert Dubno**, Reg. 19,752; **Jonathan Myers**, Reg. 26,963; **Andrew Wilford**, Reg. 26,597 and each of them individually.

Address all correspondence to:

The Firm of Karl F. Ross, P.C.
Customer Number 535

5676 Riverdale Avenue, Box 900
Bronx, New York 10471-0900

Direct all telephone calls to: (718) 884-6600

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or

both, under 18 USC 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

100 Full name of first inventor:

Heinz-Dieter BEECK

Inventor's signature



Date:

23/11/2001

Residence: Frankfurt am Main, Germany

Citizen of Germany

Post-office Address: Oberlindau 55, D-60323 Frankfurt am Main, Germany

Full name of second inventor:

Roland ESTELMANN

Inventor's signature

Date:

Residence: Landau, Germany

Citizen of Germany

Post-office Address: Bornergasse 11, D-76829 Landau, Germany

Full name of third inventor:

Rainer TIETZE

Inventor's signature



Date:

23/11/2001

Residence: Nauheim, Germany

Citizen of Germany

Post-office Address: Mozart-Strasse 5, D-64569 Nauheim, Germany

Full name of fourth inventor:

Andreas WEICHEL

Inventor's signature



Date:

23/11/2001

Residence: Usingen, Germany

Citizen of Germany

Post-office Address: Johann-Sebastian-Bach-Strasse 59, D-61250 Usingen, Germany

DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that: My residence, post-office address, and citizenship are as stated below next to my name,

I believe that I am an original joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled

SELF-SEALING COMPACT SPINNERET FOR A MELT SPINNING PROCESS

the specification of which was filed on **24 June 2000** as PCT application **PCT/EP00/05840**.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

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Serial Number	Filing Date	Status
PCT/EP00/05840	24 June 2000	Pending

I hereby appoint as attorneys to prosecute this application and to transact all business connected therewith: **Herbert Dubno**, Reg. 19,752; **Jonathan Myers**, Reg. 26,963; **Andrew Wilford**, Reg. 26,597 and each of them individually.

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Direct all telephone calls to:

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or

both, under 18 USC 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of first inventor: **Heinz-Dieter BEECK**

Inventor's signature _____ Date: _____

Residence: **Frankfurt am Main, Germany**

Citizen of Germany

Post-office Address: **Oberlindau 55, D-60323 Frankfurt am Main, Germany**

Full name of second inventor: **Roland ESTELMANN**

Inventor's signature *X Roland Estelmann* Date: *22.11.01*

Residence: **Landau, Germany**

Citizen of Germany

Post-office Address: **Bornergasse 11, D-76829 Landau, Germany**

Full name of third inventor: **Rainer TIETZE**

Inventor's signature _____ Date: _____

Residence: **Nauheim, Germany**

Citizen of Germany

Post-office Address: **Mozart-Strasse 5, D-64569 Nauheim, Germany**

Full name of fourth inventor: **Andreas WEICHEL**

Inventor's signature _____ Date: _____

Residence: **Usingen, Germany**

Citizen of Germany

Post-office Address: **Johann-Sebastian-Bach-Strasse 59, D-61250 Usingen, Germany**